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Performance Oriented Packaging Testing of Mk 588 Shipping and Storage Drum for Packing Group II Solid Hazardous Materials

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13. ABSTRACT (Maximum 200 words)

Qualification tests were performed to determine whether the in-service Mk 588 Shipping and Storage Drum could be utilized to contain properly dunnaged solid type hazardous materials weighing up to a gross weight of 14 kg (31 pounds). The tests were conducted in accordance with Performance Oriented Packaging (POP) requirements specified by the United Nations Recommendations on the Transportation of Dangerous Goods and the Department of Transportation's Title 49 CFR and the Final Rulings published in the Federal Register, Vol. 55 on 21 Dec 90. The drum has conformed to the POP performance requirements; i.e., the drum successfully retained its contents throughout the specified tests.

14. SUBJECT TERMS	15. NUMBER OF PAGES
POP Test of Mk 588 Shipping and Storage Container	5
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PERFORMANCE ORIENTED PACKAGING TESTING OF DRUM, SHIPPING AND STORAGE, MK 588 FOR PACKING GROUP II SOLID HAZARDOUS MATERIALS

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9 July 1991

FINAL

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INTRODUCTION

The Mk 588 Shipping and Storage Drum tested, contained a simulated load of 7.2 kg (16 pounds) of sand representing the worst case of loading. Overall weight of the drum was 14 kg (31 pounds). This Performance Oriented Packaging (POP) test was performed to ascertain whether this standard container (Packing Group II) would meet the requirements as specified by the United Nations Recommendation on the Transportation of Dangerous Goods Document, ST/SG/AC.10/1, Revision 6, Chapters 4 and 9. A base level vibration test was also conducted in accordance with the final rulings specified in the Department of Transportation's Performance Oriented Packaging Standards in the Federal Register Volume 55. Due to unavailability, the number of drums used was less than the number required by the UN recommendation. This has been approved by the Under Secretary of Defense, Memorandum for the Joint Logistics Commanders dated 22 February 1990.

The objectives of these tests were to minimize the risk of personnel or environmental exposure to the hazards associated with the contents in the advent of a transportation or handling accident.

TESTS PERFORMED

1. Base Level Vibration Test

This test was performed in accordance with paragraph 178.608 of the Performance Oriented Packaging Standards, Final Ruling, published in the Federal Register, Vol. 55, No. 246, December 21, 1990. One sample drum was placed on the repetitive shock platform. The drum was restrained during vibration in all but the vertical direction. The frequency of the platform was increased until the drum left the platform 1/16 of an inch at some instant during each cycle. Test time was 1 hour at a frequency of 3.7 Hz.

2. Stacking Test

This test was performed in accordance with ST/SG/AC.10/1, chapter 9, paragraph 9.7.6. One drum was used throughout the test. The drum was subjected to a force applied to its top surface equivalent to the total weight of identical packages stacked to a height of 3 meters (9.84 feet) (including the test sample). A weight of 158.7 kg (350 pounds) was stacked on the sample drum. The test was performed for 24 hours. After the allowed time, the weight was removed and the drum examined.

3. Drop Test

This test was performed in accordance with ST/SG/AC.10/1, chapter 9, paragraph 9.7.3. Two drops were performed from a height of 1.2 meters (4 feet) in the following orientations (one drum was used for both orientations):

a. Horizontally.

b. Diagonally on the edge between the cover assembly and the top ring of the drum.

This test was performed at an ambient temperature of +70 ± 20 °F.

PASS/FAIL (UN CRITERIA)

1. Base Level Vibration Test (HM-181 CRITERIA)

The criteria for passing the base level vibration test is outlined in paragraph 178.608 of the Title 49 CFR Final Ruling and states the following: "immediately following the period of vibration, each package shall be removed from the platform, turned on its side and observed for any evidence of leakage. Rupture or leakage from any of the packages constitutes failure of the test."

2. Stacking Test (UN CRITERIA)

The criteria for passing the drop test is outlined in paragraph 9.7.6.3 of ST/SG/AC.10/1 and states the following: "... no test sample should leak. No test sample should show any deterioration which could adversely affect transport safety or any distortion liable to reduce its strength or cause instability in stacks of packages."

3. Drop Test (UN CRITERIA)

The criteria for passing the drop test is outlined in paragraph 9.7.3.5 of ST/SG/AC.10/1 and states the following: "Where a packaging for solids undergoes a drop test and its upper face strikes the target, the test sample passes the test if the entire contents are retained by an inner packaging or inner receptacle; e.g., a plastic bag, even if the closure is no longer sift-proof. A slight discharge from the closure(s) upon impact should not be considered to be a failure of the packaging provided that no further leakage occurs."

TEST RESULTS

1. Base Level Vibration Test

Satisfactory.

2. Stacking Test

Satisfactory.

3. Drop Test

Satisfactory.

DISCUSSION

1. Base Level Vibration Test

Immediately after the vibration test was completed, the drum was removed from the platform, turned on its side and observed for any evidence of leakage. There was no leakage to the drum as a result of this test.

2. Stacking Test

The drum was visibly checked after the 24-hour period was over. There was no leakage, distortion, or deterioration to the drum as a result of this test.

3. Drop Test

After each drop, the drum was inspected for any damage which would be a cause for rejection. Final inspection indicated damage was minimal with only minor denting noted. The drum remained intact and functional upon completion of the tests.

REFERENCE MATERIAL

A. United Nation's "Recommendation on the Transportation of Dangerous Goods," ST/SG/AC.10/1, Revision 6

B. Title 49 CFR 107, et al., Performance Oriented Packaging Standard; Changes to Classification, Hazard Communication, Packaging and Handling Requirements Based on UN Standards and Agency Initiative; Final Rule, Federal Register, Vol. 55, No. 246 of December 21, 1990.

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TEST DATA SHEET

DATA SHEET:	
Container: Mk 588 Shipping and Storage Drum	
Type: 1A2	**Container P/N or NSN:** NSN 8140-01-113-5430
Specification Number: DL 2541494	**Material:** Steel
Gross Weight: 14 kg (31 pounds)	**Dimensions:** 17.4" D x 10.3" L
Closure (Method/Type): Removable Cover w/Lock Ring	**Tare Weight:** 6.8 kg (15 pounds)
Additional Description:	
PRODUCT:	
Name: See table	**NSN(s):** See table
United Nations Number: See table	
United Nations Packing Group: II	
Physical State (Solid, Liquid, or Gas): Solid	
Vapor Pressure (Liquids Only): N/A **At 50 °C:** N/A **At 55 °C:** N/A	
Consistency/Viscosity: N/A	**Density/Specific Gravity:** N/A
Amount Per Container: 1	**Flash Point:** N/A
Net Weight: See table	
TEST PRODUCT: Simulated weights of sand and foam	
Name: Sand and foam	**Physical State:** Solid
Consistency: N/A	
Density/Specific Gravity: N/A	
Test Pressure (Liquids Only): N/A	
Amount Per Container: N/A	**Net Weight:** 7.2 kg (16 pounds)

TABLE 1
Mk 588 Shipping and Storage Drum

NALC	NSN	Type	Packing Drawing	UN Code	UN Number	#/ Cntr	Weight (lb)
WW78	1356-01-098-3955	Motor Ignition and Separation Assembly, and Airframe Separation Block Assembly	2541491	E137	0257	1	11

MK 588 SHIPPING AND STORAGE DRUM
POP MARKING

UN 1A2/Y14/S/**/USA/DOD/NAD

** YEAR LAST PACKED OR MANUFACTURED

Encl (2)